GENERAL DYNAMICS
SATCOM Technologies

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USERS MANUAL

Mobile VSAT Auto Acquiring Internet Antenna System

.98 Meter/1.2 Meter

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Section I Introduction

1.1 Introduction

The General Dynamics Mobile VSAT Auto Acquiring Internet System has been built to the highest standards to provide years of reliable service. It has been designed with simplicity in mind: simple to set up, simple to use and simple to maintain. It is also designed to allow easy field repair or replacement of parts if needed.

Careful attention during the installation, assembly and programming of the Mobile VSAT system will assure maximum performance. Please read this manual completely before beginning assembly.

This User's Manual assumes that the Mobile VSAT has been pre-programmed for the target satellite(s). *This User's Manual was designed for the end user to assist primarily with the initial assembly and the day to day use and operation of the Mobile VSAT system. It only addresses features that can be accessed from either the Front Panel or GUI access with Level 1 access.*

For complete installation and programming, as well as complete GUI instructions, please see the Mobile VSAT Installation & Programming Manual.

If you have any questions about the Mobile VSAT System, please contact our customer service department at 828-464-4141 (8:00am – 5:00pm EST Monday through Friday) or visit our website at www.gdsatcom.com.

1.2 Precautions and Reminders

- This device emits radio frequency energy. Do not place your head or other body parts between transmitting feed horn and reflector when system is operational.
- Before performing any maintenance or upgrades, unplug the unit from power source.
- Do not try to manually move antenna or hinder antenna movement as this could result in bodily injury or damage to the unit.
- Be aware of pinch points while the antenna is being positioned, deployed or stowed.
- Do *not* move the vehicle while the antenna is deployed.
- Do *not* attempt to deploy the unit while the vehicle is in motion.
- Do *not* attach or hang items from the antenna unit.

Section I Introduction

1.3 General Information

The General Dynamics Mobile VSAT Auto Acquiring Internet System will allow you to access the World Wide Web from virtually anywhere your vehicle can take you. You just need a clear view of the southern sky.

The Mobile VSAT system can be deployed from the stowed position and acquire a pre-selected satellite by the simple press of a button on the model 7000 Controller. Pressing the same button again stows the system and prepares it for the next acquisition. The controller allows the user's PC to be off while the antenna control system remains fully operational (i.e. the system architecture is PC independent). Complete system status is also available without a computer. The Front Panel has a status light that flashes Red or Yellow status and error "Blink Codes".

A user may access the Mobile VSAT's web-based Graphical User Interface (GUI) by using a web browser. The GUI is designed to provide advanced features, remote availability of diagnostic information and the downloading of updates. Enter a password and gain full control of the unit for setup and programming. There is also a user level password, which will provide limited control for local users, if needed.

Once the Mobile VSAT is assembled and setup, it becomes a "One-Button" solution for connection to the Internet. It is that simple.

1.4 Terms & Glossary

Throughout this manual, the following terms and acronyms will be used.

BUC	**Block Up Converter (transmitter)**
LNB	**Low Noise Block Converter**
OMT	**Orthomode Transducer**
ICE	**Interface Control Electronics**
ACE	**Antenna Control Electronics**
ISP	**Internet Service Provider**
GUI	**Graphical User Interface**
GPS	**Global Positioning System**

The following related Documents and Addendums are available

Related Documents	**Addendums**
Installation & Programming Manual	**Feed Orientations**
Field Service Manual	**Optional Bulkhead**
Troubleshooting Guide	**Vehicle Bulkhead**
Quick Start Guide	
Satellite Setup Quick-Start Guide	

NOTE: Some Documents are only available to Certified Mobile VSAT Dealer/Installers

Section II System Overview

2.1 Satellite Internet Overview

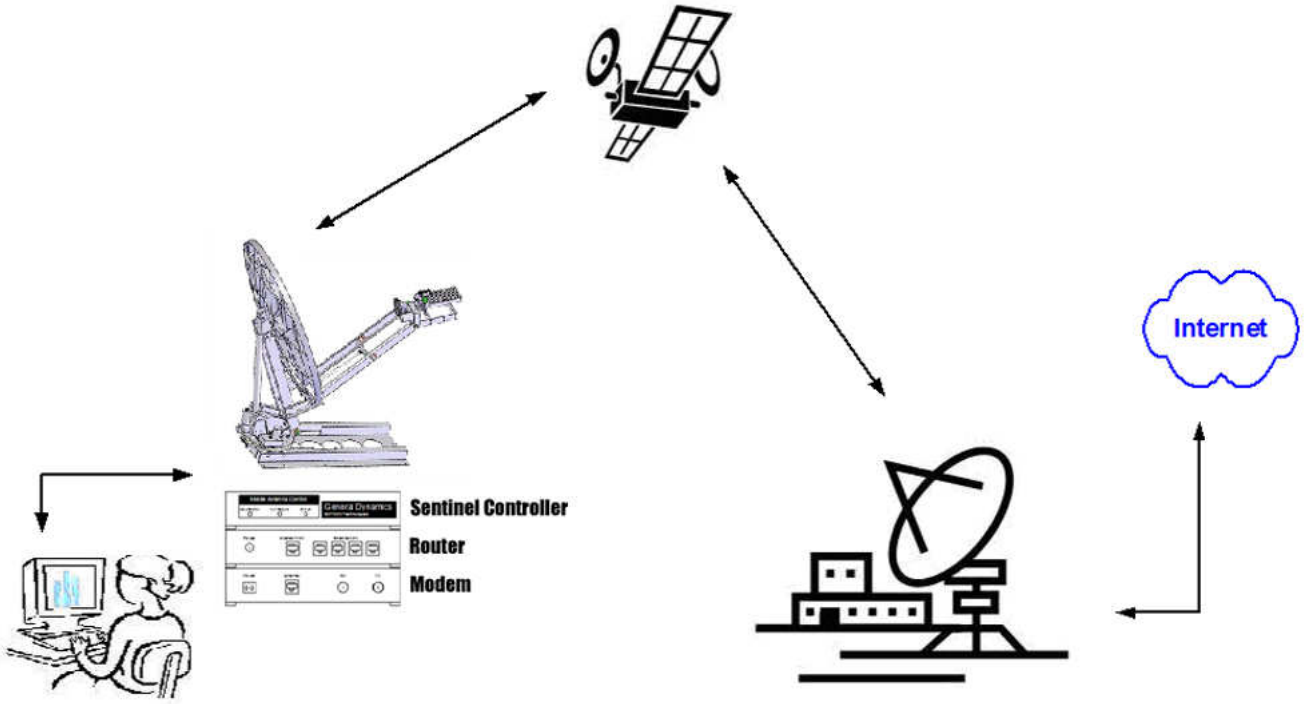


Figure 2.1

Satellite Internet is simply using a satellite link for your broadband connection to the Internet instead of traditional terrestrial connection methods. (A wire, such as Cable or DSL; or wireless, such as Cellular) To use Satellite Internet you have to aim your antenna at the satellite determined by your Internet Service Provider (ISP). The antenna is fitted with a BUC to transmit and an LNB to receive. The BUC and LNB transmit and receive information to and from the modem. The BUC, LNB, and Modem are provided by your ISP. The Modem is connected to the Mobile VSAT Model 7000 Controller and your computer(s) via an Ethernet Hub.

The Mobile VSAT system takes care of the first and most important part of this process; the aiming and peaking the antenna. This is critical because without proper antenna alignment, you can never fully utilize the bandwidth from your ISP.

Section II System Overview

2.2 Components List

Mobile VSAT System Includes:

- **Mobile VSAT Reflector and Pedestal Mount**
- **Mobile VSAT Model 7000 Controller**
- **120VAC Power Supply**
- **GPS Antenna**
- **Mounting Hardware**
- **User's Manual**

Figure 2.2

Additional Equipment Required: (customer supplied)

- Modem
- Router or Ethernet Hub
- CAT-5 Ethernet Cable of appropriate lengths to connect your computer, modem, and Model 7000 Controller to the Ethernet Router or Hub.
- RG-6 Coax Cable – 100' Max. (3 required; Receive, Transmit, Communications)

2.3 Computer Requirements

Note: In order to properly connect to the Internet, a computer (laptop or desktop) with Internet Explorer installed is required.

	PC	Mac
Operating System:	Windows 98SE, Windows ME, Windows 2000, Windows XP	9.0-10.2 or higher
Processor:	Pentium II 333MHz or faster	300 MHz or faster
Memory (RAM):	64MB RAM (Windows 98SE and Windows ME) 128MB RAM (Windows 2000 and Windows XP)	128MB
Free Hard Drive Space:	100MB	150MB
Networking Capability:	10/100 Ethernet	10/100 Ethernet

Section II System Overview

2.4 Front Panel

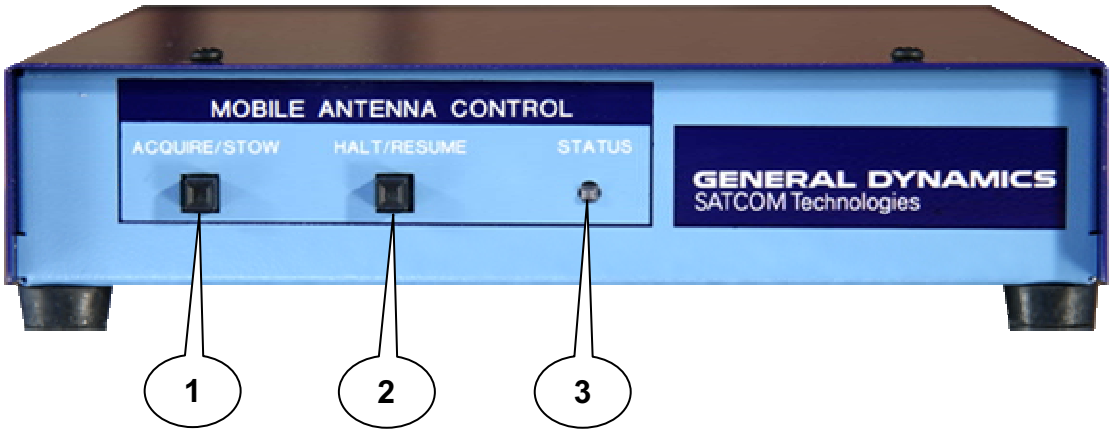


Figure 2.3

Model 7000 Controller Front Panel

Front Panel:

Operation of the Mobile VSAT system couldn't be easier!
There are only two buttons and a status light on the front panel. Each button is a momentary push-button style switch with a single color Green LED. The STATUS light is a two-color (Red/Yellow) LED.

1) ACQUIRE/STOW Button – Press and release the ACQUIRE/STOW button to power up the Mobile VSAT and acquire a pre-programmed satellite. Press and release it again to stow the Mobile VSAT after use.

2) HALT/RESUME Button – Press and release the HALT/RESUME button to stop the movement of Mobile VSAT at any time. Press and release it again, and the Mobile VSAT will resume the last command given prior to halting.

3) STATUS LED – The STATUS LED keeps the user informed of the status of the Mobile VSAT system. This LED notifies the user of warnings and faults and will initiate a blink code to indicate the "warning" number in yellow or a "fault" number in red.

The Controller's enclosure is made from 22 Gauge steel with paint grip zinc plating. This enclosure has a baked on paint/powder coat finish for durability. The steel enclosure provides mobile environment ruggedness and EMI shielding.

Size: Height - 1.75" (Sized to fit inside 1 Rack Height Unit) Depth - 7.25" Width - 7.0"

Section II System Overview

2.5 Rear Panel

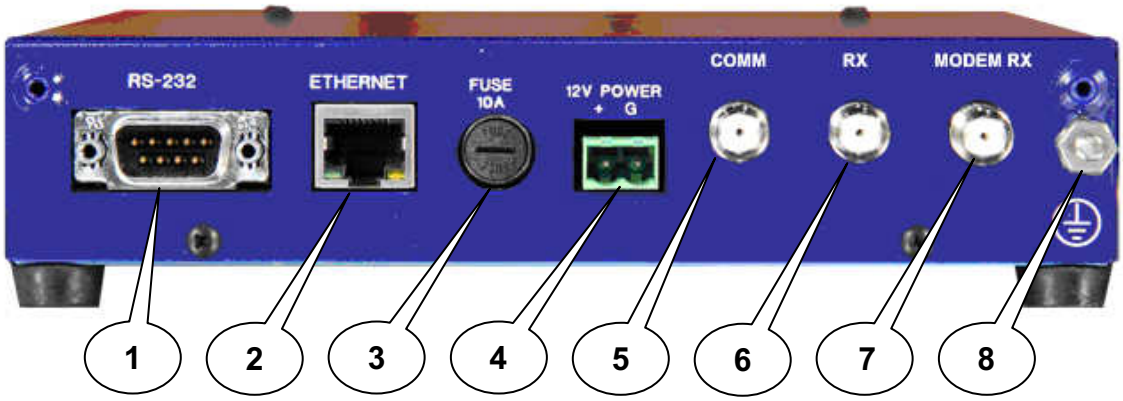


Figure 2.4

Model 7000 Controller Rear Panel

The rear panel contains six connectors, a fuse and a grounding post.
The function of these connectors is as follows:

1) **RS-232** – Sub-D female 9 pin connector for serial interface to the I-Modem .™ It also allows HyperTerminal™ connection for troubleshooting.

2) **ETHERNET**- RJ-45 female connector for a 10/100 full duplex Ethernet port. This Ethernet port allows for easy connectivity to a computer network and permits remote control commands and remote updating of the system.

3) **FUSE** - 10 Amp 5x20mm Fast-Acting fuse limits the current from the 12 Volt power source.

4) **12 V POWER**
Option 1: A 120VAC to 12VDC power supply is furnished with the system.
Option 2: A field wire-able 12 volt battery power connector is also supplied with the Controller. This connector only requires stripping two #14 AWG wires, inserting these into the connector and tightening the screws. The supply end positive wire should go to a 15 amp fuse in a distribution block.

5) **COMM** - Type F female connector for the COM Link (communications).

6) **RX** - Type F female connector for the RX Output (receive coax to LNB).

7) **RX MODEM** - Type F female connector for the RF Input (coax from modem).

8) **8-32 Ground Stud** - For best lightning protection this case ground should be attached to the nearest vehicle chassis point using tinned copper braid, heavy gauge wire, or metal bracket (i.e.: pipe hanger strap). The ground wire may be locally connected near the Controller.

Section III Installation

3.1 Installation Overview

Because of the mobility of the Mobile VSAT System, it can be installed in a variety of locations and applications; Vehicular, Trailer-Mounted, RV, Rooftop and many others. This section is not intended to answer all installation questions but to cover the basics that apply to all installs.

This User's Manual covers basic installations that may be done by an end user and is not intended to be a complete installation manual.

Typically, the Mobile VSAT system is provided to an end user by an ISP along with a Modem, a BUC and an LNB. The ISP will pre-program the Mobile VSAT Controller and setup parameters for the network. For the purpose of this manual, it is assumed that:

A. You have your Modem, LNB, BUC, Router and all necessary RG-6 coaxial and network cables of sufficient length available.

AND

B. Your installation falls into category 1, 2 or 3 below.

1. Mobile VSAT system arrives completely assembled except for the wiring
If your Mobile VSAT arrived fully assembled, All that remains is to attach it to a suitable mounting surface and connect 3 RG-6 coaxial cables from the Pedestal to the Model 7000 Controller.

See: 3.2 Unpack & Inventory
3.3 Mounting Surface
3.5 Basic Mobile VSAT Wiring Diagram
4.1 Basic Operation

2. Mobile VSAT system arrives assembled except for the BUC/LNB
If your Mobile VSAT system requires assembling the BUC/LNB and/or installing that assembly onto the Mobile VSAT, it will probably require attaching the reflector as well. If so, install the BUC/LNB assembly onto the feed BEFORE attaching the reflector.

See: 3.4 Attaching BUC/LNB

3. Mobile VSAT system arrives assembled except for the reflector
If your Mobile VSAT system is fully assembled, except for attaching the reflector to the pedestal, follow the steps above, then

See: 3.7 Attaching Reflector

4. Mobile VSAT system arrives un-assembled. (Factory Default)
Before the Mobile VSAT system can be successfully deployed, it must first be set up and programmed. This will require the Installation & Programming Manual, the target satellite parameters and a clear understanding of what you are doing. Contact your Mobile VSAT Dealer for support.

See: Satellite Setup Quick-Start Guide
Installation & Programming Manual
***CAUTION* For Advanced Users. Requires Level 2 Access.**

Section III Installation

3.1 Installation Overview (continued)

The Mobile VSAT system should typically be assembled following the order shown in this section.
It is recommended to connect ALL electronics, as they are going to be installed, and conduct a complete system test prior to installing in permanent mounting location. Gather all of the ISP provided electronics that have not yet been installed (if any) as well as all necessary ETHERNET & RG-6 COAX cabling. You will also need a power source.

3.2 Unpack & Inventory

The Mobile VSAT system is shipped from the factory in two containers.
- A Cardboard box containing the Reflector
-A boxed pallet containing the pedestal and a smaller box containing:
  Model 7000 Antenna Controller
  Power Supply
  GPS Antenna
  Reflector Mounting Hardware
  Feed Hardware Kit Number 0200-1242
  User's Manual

3.3 Determine & Prepare Mounting Surface

When deciding where to mount your Mobile VSAT Pedestal, you should consider the following:

Level – The Mobile VSAT system has onboard tilt sensors and can operate on a tilt of up to 10 degrees. However, the more out of level, the longer the Satellite acquisition takes. Always try to start from the most level position available.

Clearance – You must allow enough clearance to permit full motion of the Azimuth and Elevation movements of the Mobile VSAT pedestal. To avoid damage, verify this PRIOR to the permanent attachment to your mounting surface.

Rigid Mounting Surface – The mounting surface must be rigid enough not to flex as the mount moves in its Azimuth travel.

Weight – Be sure the mounting surface will support the weight and the associated wind loads that may occur during use and transportation.

Access – Access to your mounting location may determine the best order in which to assemble or install the Mobile VSAT pedestal. If your mounting location is in a hard to get to spot, it is a good idea to test and assemble as much as possible while the pedestal is still attached to the shipping pallet, prior to final installation. In some instances it is easier to attach the Mobile VSAT base to the mounting surface before attaching the Reflector.

Section III Installation

3.4 Feed Assembly

The Mobile VSAT system can be fitted with one of two feed assemblies. The Standard Feed is used when the ISP network is anything other than Hughes Network Systems. The Hughes Feed is used when the ISP network is Hughes Network Systems.

3.4a Standard Feed Assembly

The Mobile VSAT's standard feed assembly ships from the factory assembled for vertical receive polarization and horizontal transmit polarization. If your application requires horizontal receive polarization, and vertical transmit polarization remove the five screws holding the OMT to the feed horn, rotate the OMT until the arrow indicator aligns with the marking "**HORIZ. Rx**", and re-install the screws. Be careful not to lose or damage the o-ring. Tighten hardware securely using a small amount of LockTite on the threads.

FEED ASSEMBLED FOR VERTICAL RECEIVE

Figure 3.1

FEED ASSEMBLED FOR HORIZONTAL RECEIVE

Figure 3.2

1. Align the opening on the BUC with the opening on the through port of the OMT and attach the BUC to the OMT with the hardware and o-ring provided with the BUC. Tighten hardware securely using a small amount of LockTite on the threads.

2. Align the opening on the LNB with the opening on the receive port of the OMT and attach the LNB to the OMT with the hardware and o-ring provided with the LNB. Tighten hardware securely using a small amount of LockTite on the threads.

3. Attach the receive coax cable (labeled Rx) to the LNB's coax connector and the transmit coax cable (labeled Tx) to the coax connector on the BUC.

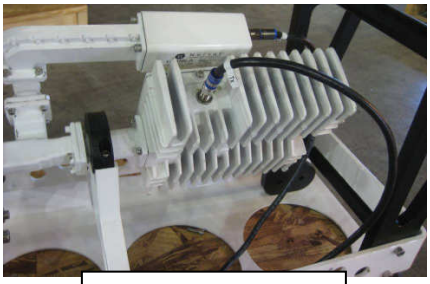


Figure 3.3

Section III Installation

3.4b Hughes Network Systems Feed Assembly

Typically, it is easiest to pre-assemble the Hughes BUC and LNB on a workbench and then install the assembly into the Mobile VSAT's feed support bushings.

1. The Hughesnet transmit/receive electronics are supplied by Hughes Network Systems with the transmitter (BUC) attached to the LNB/OMT with a section of rigid waveguide as shown in the figure below. When used with the Mobile VSAT antenna, the rigid waveguide section must be removed and replaced with the waveguide supplied with the Mobile VSAT unit. To do this, remove the four screws attaching the waveguide to the BUC and the four screws attaching the waveguide to the LNB/OMT. Keep the screws, waveguide spacer, and the o-rings and set aside the rigid waveguide.

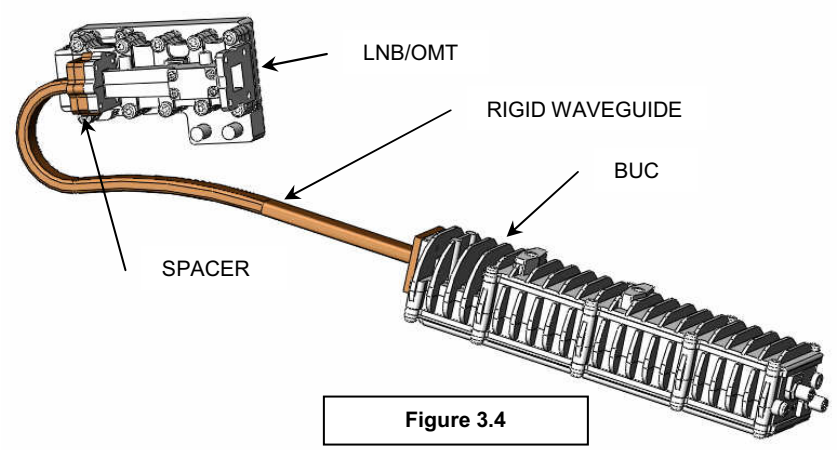
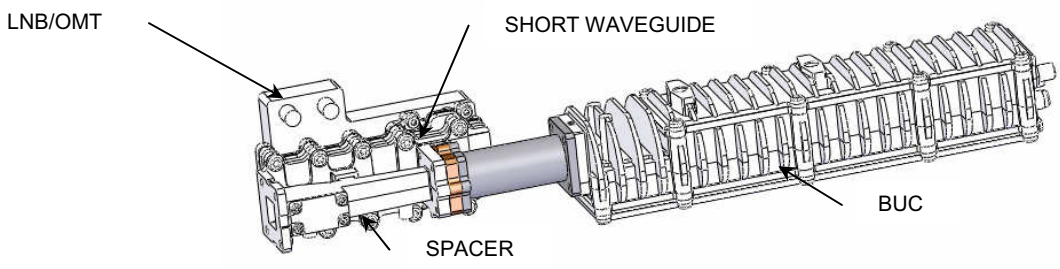


Figure 3.4

HUGHESNET TRANSMIT/RECEIVE ELECTRONICS AS SUPPLIED BY HUGHES NETWORK SYSTEMS

2. Locate the short waveguide supplied with the Mobile VSAT system. Re-assemble the BUC and LNB/OMT as shown in the figure below using the screws, waveguide spacer, and o-rings from the original assembly. (Because of the flange interfaces, the waveguide can only be assembled in one direction/orientation.) Tighten all hardware securely.



HUGHESNET TRANSMIT/RECEIVE ELECTRONICS ASSEMBLED FOR MOBILE

Figure 3.5

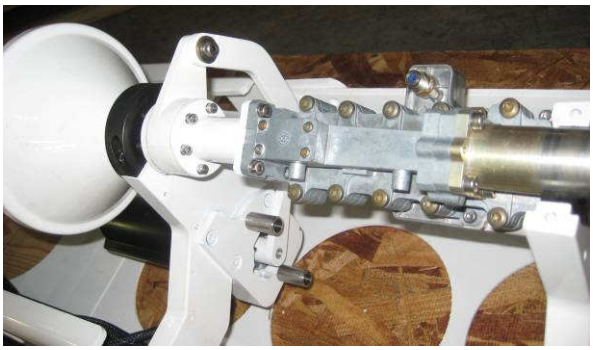
Section III Installation

3.4b Hughes Network Systems Feed Assembly (Continued)

3. Place the assembly from step #2 into the feed cradle with the short waveguide resting in the rear support bracket. Attach the OMT flange to the flange of the feed assembly using the o-ring and hardware provided. Tighten securely. **Note that the assembly must be oriented correctly. If your requirement is vertical receive polarization, orient the LNB's coax connector parallel to the feed cradle's motor arm as shown below. If your requirement is horizontal receive polarization, orient the LNB's coax connector perpendicular to the feed cradle's motor arm.**

VERTICAL RECEIVE ASSEMBLY -
COAX PARALLEL TO MOTOR ARM

Figure 3.6

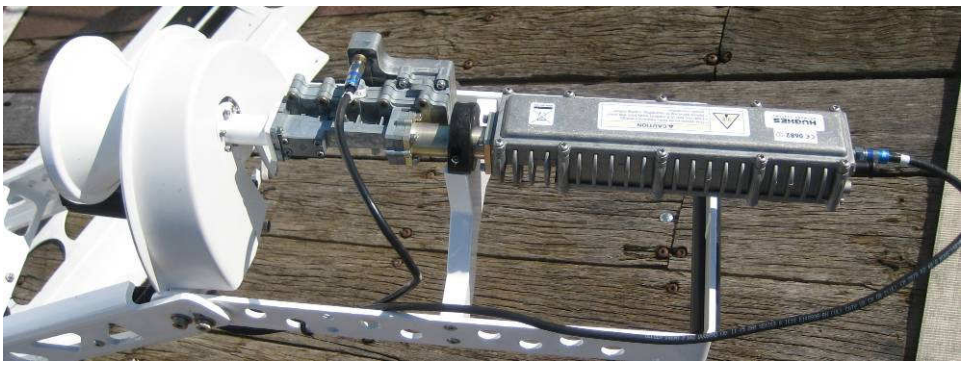


HORIZONTALRECEIVE ASSEMBLY -
COAX PERPENDICULAR TO MOTOR ARM

Figure 3.7

4. Secure the assembly in the feed cradle by attaching the top clamp on the rear support bracket. Tighten the two screws securely.

5. Attach the receive coax cable (labeled Rx) to the LNB's coax connector and the transmit coax cable (labeled Tx) to the coax connector on the BUC.



COMPLETED HUGHESNET FEED ASSEMBLY

Figure 3.8

Section III Installation

3.5 Connect Wiring

After your Mobile VSAT system has been mechanically installed, the next step is to complete the wiring from the Pedestal/Antenna to the Model 7000 Controller, Modem, Computer, GPS, Ground and Power Supply.

Wiring for the Mobile VSAT system has been designed for simplicity in the field. Antenna connections are clearly identified and easily located at the rear of the base unit.

It is recommended to label and/or color-code the RG-6 Coax Cables on both ends.

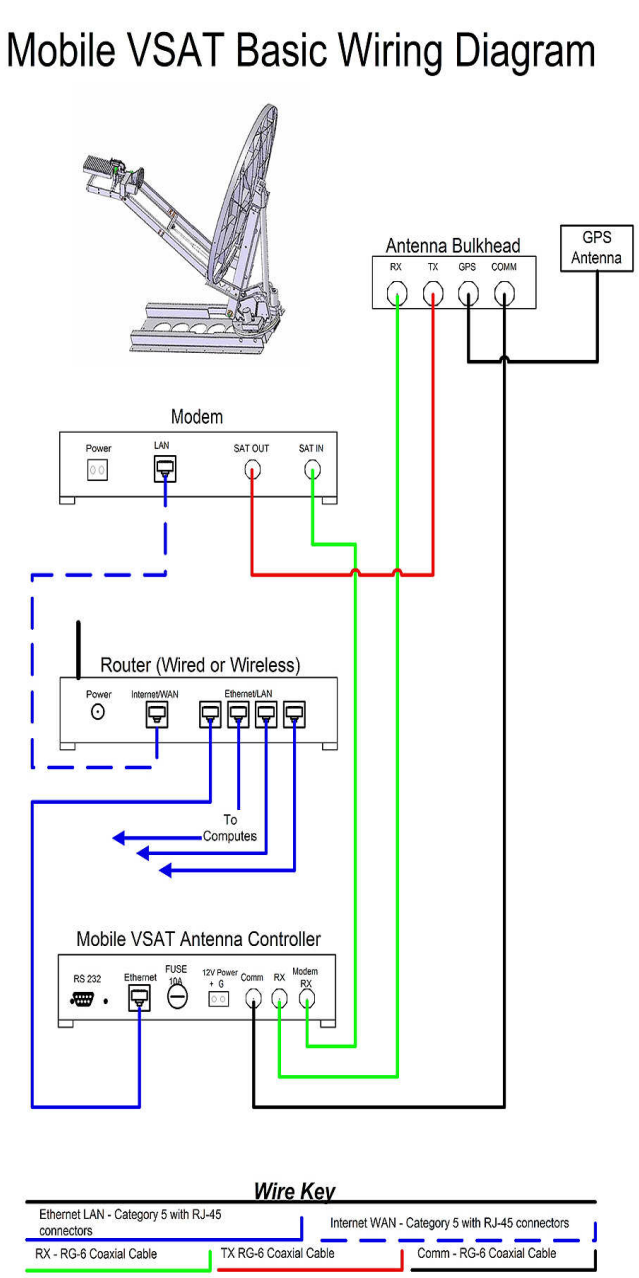


Figure 3.9

Starting at the Mobile VSAT Pedestal Bulkhead:

1. Connect the supplied GPS antenna to connector labeled "**GPS**" on the antenna bulkhead. Place the GPS antenna in a location that allows clear view of the sky. This cable may be extended with RG-6 coax cable if necessary.

2. Connect the (3) RG-6 Coax Cables to the Receive (**RX**), Transmit (**TX**) and Communications (**COMM**) connectors on the antenna bulkhead. These connections should include a generous amount of dielectric grease in the connector, covered by a weatherproof sealant or tape.

3. Connect the other end of the (3) RG-6 Coax Cables to the Mobile VSAT Model 7000 Controller and the modem as shown in the diagram (Figure 3.9)

4. Locate and install a Ground connection from the Controller to the vehicle frame or other approved Ground location. (standard #14 gauge vehicle wire)

5. Connect a standard CAT-5 Ethernet cable from the Controller directly to an Ethernet Router for PC connections.

6. Connect the Controller. Modem and Router to a power source.

Section III Installation

3.6 Elevate Pedestal

Now that all of your cables are connected, press and release the AQUIRE/STOW button. The unit will power up and the pedestal will deploy to an upright position and pause. When it pauses, press the HALT/RESUME button to stop motion.

3.7 Attach the Reflector

1. It is easiest to install the reflector with the antenna pedestal raised up from the stowed position to the deployed position. To accomplish this, complete the wiring connections outlined in Section 3.2 and the feed assembly outlined in Section 3.3 or 3.4 and apply power to the ICE unit. With power applied, press and release the **ACQUIRE/STOW** button on the front panel. After completing the power-up sequence, the pedestal will rise to a vertical position. Once the pedestal is in the vertical position, press and release the **HALT/RESUME** button to stop any further motion while the reflector is being installed.

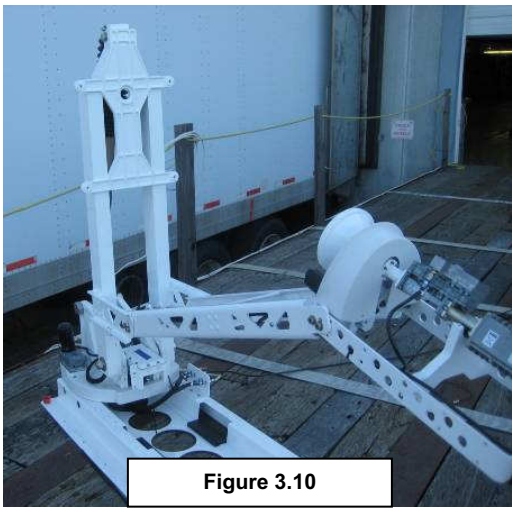
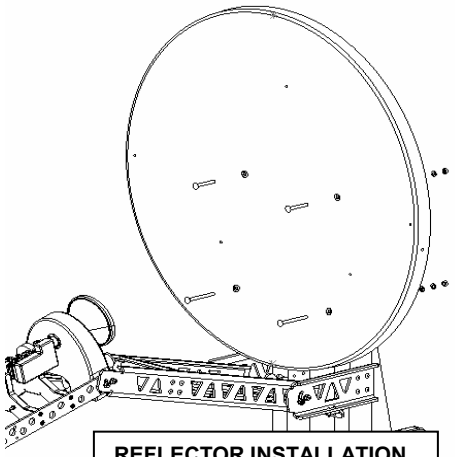


Figure 3.10

PEDESTAL IN DEPLOYED POSITION

2. The reflector supplied with your Mobile VSAT Antenna System is designed with offset optics and must be installed in the correct orientation (top / bottom). This is easily accomplished by observing the position and orientation of the Mobile VSAT logo on the reflector's front face.

3. Position the reflector on the pedestal's reflector support. Align the holes of the reflector with the mating holes in the reflector support bracket. Attach the reflector with the 5/16" hardware provided. Note that there are two longer and two shorter carriage bolts. The longer bolts are for the two lower holes in the reflector and the shorter bolts are for the two upper holes. Secure each bolt with a flat washer, lock washer, and hex nut. Tighten securely.



REFLECTOR INSTALLATION

Figure 3.11

3.8 Stow & Deploy

1. With the reflector installed, you may press the **STOW** button to return the pedestal to the stowed position or press the **RESUME** button to continue with satellite acquisition.

Section IV Operating Instructions

4.1 Antenna Operation – Front Panel

Figure 4.1

Model 7000 Controller Front Panel

General Operation

After the Mobile VSAT has been programmed, the user simply has to press the **ACQUIRE/STOW** button to deploy the Mobile VSAT and acquire the desired satellite and then press the same button again to stow it.

Each button has a toggle function. For example, pressing the **HALT/RESUME** button once will cause the system to halt; pressing it again will cause the system to resume its current command. Pressing it again will cause it to halt again and so on.

The green lights in the center of the switches will, along with the status light, indicate the system's status. These buttons will also be used to put the controller into different modes. During startup, the **Status** light will flash once or twice to indicate which bank the controller booted up to.

Before start-up, all lights will be OFF. The antenna is stowed and the system is in sleep mode. To power up, press the ACQUIRE/STOW button. The button's green LED switches on and the status light will illuminate yellow for a few seconds and then will flash and go dark. The controller then checks to see if the antenna is stowed. If the antenna is not stowed, the controller will initiate the Stow sequence before proceeding with the Acquire sequence. If the antenna is stowed, the controller will initiate the Acquire sequence. The ACQUIRE/STOW button will begin to flash and will continue to flash until the acquisition is completed. The STATUS LED will flash during start-up but generally will remain OFF unless a warning or fault occurs.

See Blink the Code Chart in the Reference Section for a complete list of Blink Codes

Deployment

Once the boot-up is complete, the controller checks to see if the antenna is locked on the target satellite or stowed. If the antenna is locked on the target satellite, the Acquire/Stow LED will turn to a solid green LED ON and no further action will take place. If the antenna is not on

Section IV Operating Instructions

Deployment (continued)

target and not stowed, the controller will initiate the Stow sequence before proceeding with the Acquire sequence. If the antenna is stowed, the controller will proceed directly to the Acquire sequence. The **ACQUIRE/STOW** button LED will continue blinking, indicating that the controller is proceeding with the command but has not yet completed the commanded action.

When the auto-acquire sequence has located and peaked on the programmed target satellite, the blinking **ACQUIRE/STOW** LED will turn to a solid green LED ON.

During the time the antenna is deploying the **HALT/RESUME** button will serve as a motion halt button. When this button is pressed, the antenna will stop its motion and the Halt/Resume LED will blink indicating that motion has been suspended. The user can then either press Halt/Resume again to continue the existing sequence command, or press Acquire/Stow to initiate the alternate command. For example: Instead of continuing to acquire the satellite, change to the Stow sequence.

Stowing

To shut down and stow the antenna, the user presses the **ACQUIRE/STOW** button. The Acquire/Stow LED will start blinking. When the Stow sequence is complete, the Acquire/Stow LED will turn to a solid Green LED ON for 10 seconds and then turn OFF (all LED's are dark and the internal power and CPU systems go to a sleep mode).

Halt/ Resume

Press and release the **HALT/RESUME** button to stop the movement of Mobile VSAT at any time. Press and release it again, and the Mobile VSAT will resume the last command given prior to halting.

Modem Transmitter Safety

When the controller's DC supply power is turned off, the lack of power to the LNB will cause the modem to turn off its transmitter.

Section IV Operating Instructions

4.2 *Antenna Operation – Graphical User Interface (GUI)*

GUI access after power-up

The GUI will be accessible approximately 30 seconds after ICE power up. If you enter the ICE network IP address in the web browser, please wait at least 30-seconds after power-up. If you already have an ICE web page screen up from a prior system operation, you must close and re-launch the browser for the GUI to become active.

Web browsers supported

The GUI has been tested to perform as described below on Internet Explorer Version 6, 7 and 8; Opera 10, Firefox 3.5 and 4.0, and Safari 4.0 with Windows XP Pro and Vista.

Navigation to the Front panel menu

The front panel screen or main menu is accessed before any others when you first start the web browser. To access this screen, you must be on the network that the ICE board is connected to. Most often, this will be through a router with an ICE and PC attached to it. However, the ICE can also be connected directly to the PC with an RJ-45 cable. In either case, the default way to access the main menu is through the Internet Protocol (IP) address 192.168.75.75. This requires the router (if used) and PC to have the 192.168.75.x base addresses, where 'x' is any number from 1 to 254, except 75.

- **Note: The 'x' for the router and PC must be different. You can change the base 192.168.75.x address to any available IP address, but you will have to first access the ICE through the default address and then change the network address that the ICE responds to. Next, you can change the PC and router base IP addresses as appropriate, and then repower the ICE board.**

- **Note: The default address of 192.168.75.75 is always available, even after changing the ICE IP address in network configuration. However, it can't be used to access the ICE GUI unless the PC and router (if used) are on the same 192.168.75.x local network.**

Navigation between screens

Use the left-side menu buttons to access progressive GUI screens from the Front Panel displays. The specific items shown in that menu depend on the current user access level. For the System Operator level, the choices are Front Panel, Setup, Manual Jog, and Advanced.

The Advanced menu has its own submenu, visible when you click on it. The items in that submenu are Options, Network Configuration, Controller Configuration, and Update Firmware.

If you are not running at System Operator level, the Setup item is replaced with Access Protected, which gets you to the Access Protected Features screen.

Section IV Operating Instructions

4.2 *Antenna Operation – Graphical User Interface (GUI)*

Front Panel Page

The Front Panel Page is located at 192.168.75.75.
It is also called the default or main menu screen.

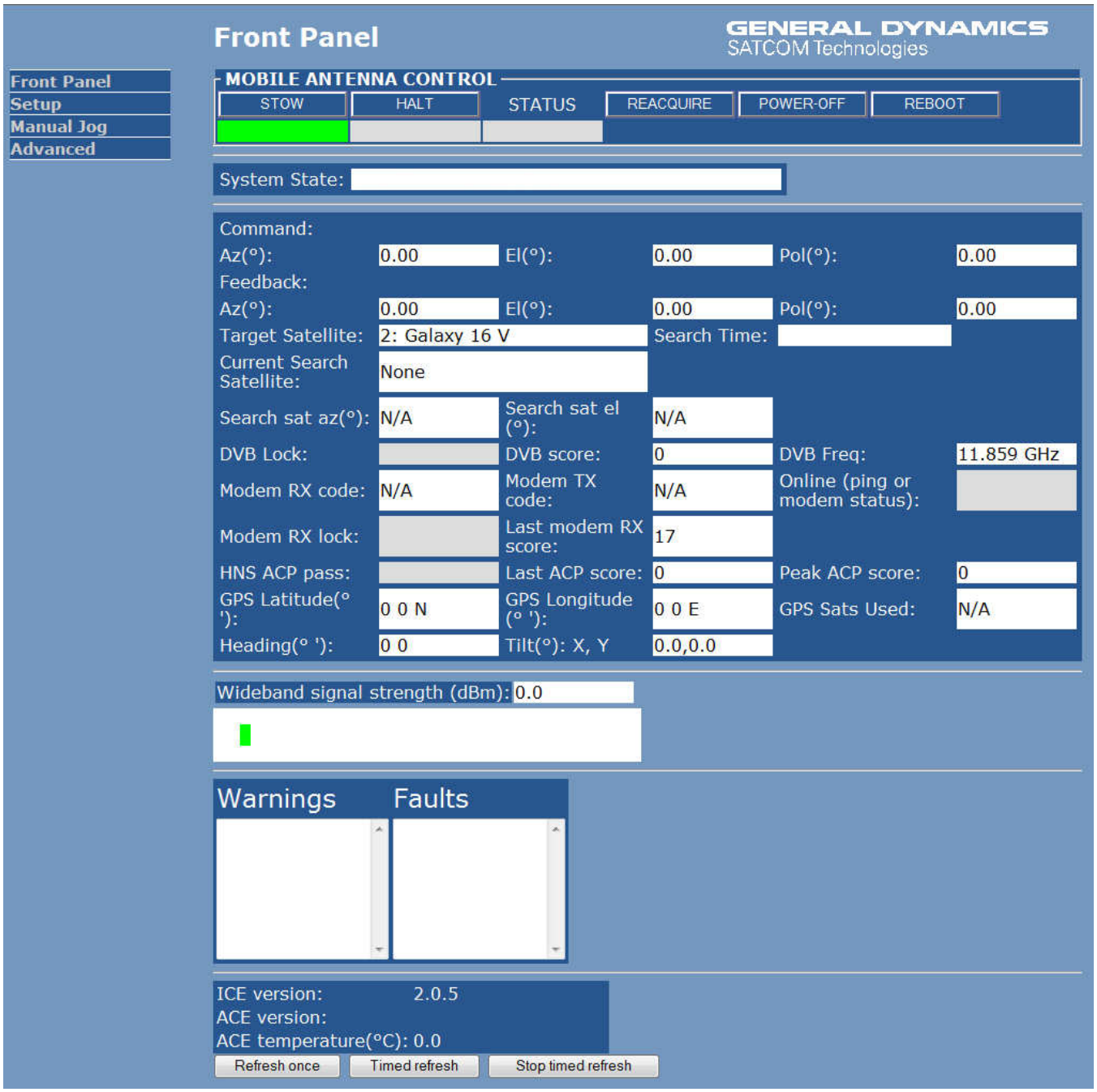


Figure 4.2

Section IV Operating Instructions

4.2 *Antenna Operation – Graphical User Interface (GUI)*

Front Panel Page (continued)

The top part of the screen is meant to simulate the unit's physical front panel.
It features the **ACQUIRE/STOW and HALT/RESUME** buttons and their function is the same as on the Front Panel of the Controller. Beneath the buttons are their LED's as well as the **STATUS LED**.

- **REACQUIRE** – This button allow the user to realign the Mobile VSAT without having to completely stow first. This feature is used if, for any reason, the Mobile VSAT moves slightly.
  (For example, snow melting under your mounting surface) Click on the button and the system re-peaks the Azimuth, Elevation and Polarity. The system will lose satellite connectivity during this process but for a much shorter period of time than stowing and reacquiring. This feature can only be used AFTER the Mobile VSAT has acquired its target satellite.
- **POWER-OFF** – This is a "No Questions Asked" power off button.
  Clicking on it has the same effect as disconnecting the power source.
- **REBOOT** – This button allows a local or remote user to reboot the Controller after firmware updates have been done. Also used in troubleshooting.
- **System State** Displays messages regarding the status of the system at any time, such as Jog mode, Stowing, Deploying, Satellite Found, etc.

The next section of the screen displays system information relating to the movement of the Mobile VSAT pedestal. Where it's going and what it's looking for.

- **Command Az, El & Pol** – These windows display where the pedestal has been commanded to go
- **Feedback Az, El & Pol** - These windows display where the pedestal actually is.
- **Target Satellite** - This window displays the name Target Satellite.
- **Current Search Satellite** - This window displays the Satellite that the Controller is currently looking for. May be different than the Target Satellite if you using a different Reference Satellite
- **Search Time** - Displays how long the system has been searching for its target satellite. Once the satellite is acquired, this field stops increasing.
- **Search Sat az and Search Sat el** – Displays calculated values for Current Search Satellite.

This section of the screen displays system status after the Target Satellite has been located.

- **DVB Lock -** indicator turns green when DVB lock is achieved. When the system is on the target and finished with an acquisition, the DVB lock indicator should be solid on.
- **DVB Freq. -** This is the DVB frequency that the controller is searching for. This information comes from the Satellite Setup Page.
- **Modem RX Lock -** This window indicates RX lock and is received from the modem.
- **Last Modem RX Score -** This window shows RX score and is also received from the modem.

Section IV Operating Instructions

4.2 *Antenna Operation – Graphical User Interface (GUI)*

Front Panel Page (continued

ACP stands for Auto-Cross-Pol. It is a feature that is exclusive to the HughesNet Satellite platform. ACP testing is only performed when a Hughes modem is selected on the Satellite Setup page, otherwise this field is always black.

- **HNS ACP Pass –** This window turns green when cross polarization testing succeeds.
- **Last ACP Score-** During the ACP test this is the most recent score.
- **Peak ACP Score –** During the ACP test this is the best score yet.
- **GPS Latitude and Longitude –** Real-time GPS information from the ACE board.
- **Heading –** Shows the Mobile VSAT's current heading. This is populated in one of three ways
  - **Onboard Compass –** Real-time compass information from the ACE board.
  - **Manual Heading input by user. (requires Level Access)**
  - **Full Circle Sweep- No compass will be used and this field will be 0**
- **Tilt -** Real-time Tilt information from the ACE board. Shows how level the pedestal is.

Below the Wideband Signal Strength are the

- **Warnings and Faults** lists show messages for any system faults or warnings that the blink codes are indicating. The Faults window turns red if any faults exist.

- **Note: Some warnings and faults cause the system to halt. To clear these types of warnings or faults, it is necessary to first remove the problem causing the fault, and then hit the halt-resume button located on the ICE front panel. If all faults and warnings have truly been cleared, warning and fault display areas of the GUI will be blank.**

The bottom section of the screen displays the current Controller (ICE) and ACE software versions as well as the current temperature of the ACE board.

Note: The ACE board is the Antenna Control Electronics board and is located on the antenna pedestal.

Refresh Buttons

The Mobile VSAT Controller has the web browser do a continual timed refresh of the GUI pages to provide the user with current feedback from the Controller. The refresh can be modified as described below. Timed Refresh is the default and will be restored each time the browser is opened.

- **Refresh Once –** Click to force a page refresh in your browser.
- **Timed Refresh –** Click to force reinstate continual timed refresh.
- **Stop Timed Refresh –** Click to stop continual timed refresh.

Section IV Operating Instructions

4.2 *Antenna Operation – Graphical User Interface (GUI)*

User access levels

Associated with the GUI interface are three levels of user access which are controlled through the use of passwords. The user-access levels determine which screens you can access, and in some cases which controls are active on a screen.

Front Panel, Level 1: No Password Required

Only the Front Panel screen and Password Login (Access Protected Features) screens are available at this level.

Front Panel, Level 2: Local User

Includes Level 1 screens, plus the Manual Jog screen and two Advanced screens: Options and Network Configuration.

Front Panel, Level 3: System Operator

Includes all Level 2 screens, the Satellite Setup screen, plus the remaining Advanced screens: Advanced Options, Controller Configuration, Antenna Parameters and Firmware Configuration.

Note: If the Local User password is set to blank, (as is the case with units shipped from the factory), then there is no Level 1, and the system defaults to Level 2. Only by setting a non-blank Local User password will Level 1 be enabled. Level 2 access will then require an additional password.

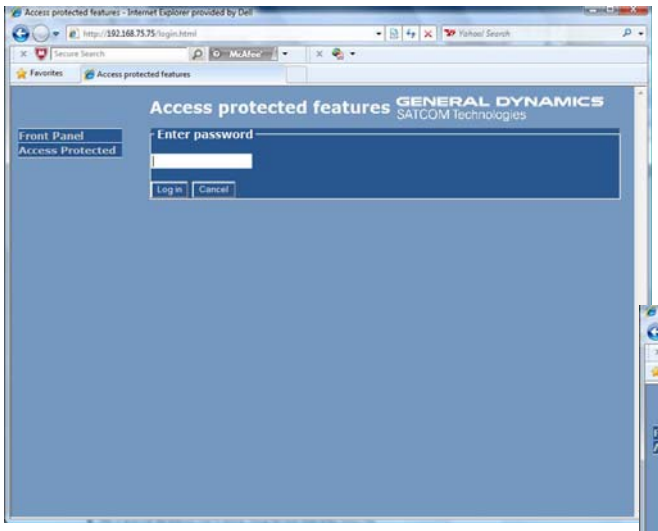


Figure 4.3

This screen allows the user to change the user access level. Inputting the correct password will provide access to more advanced features. To access a higher User Access Level, enter the appropriate password in the **Enter Password** area, then click the **Log In** button.

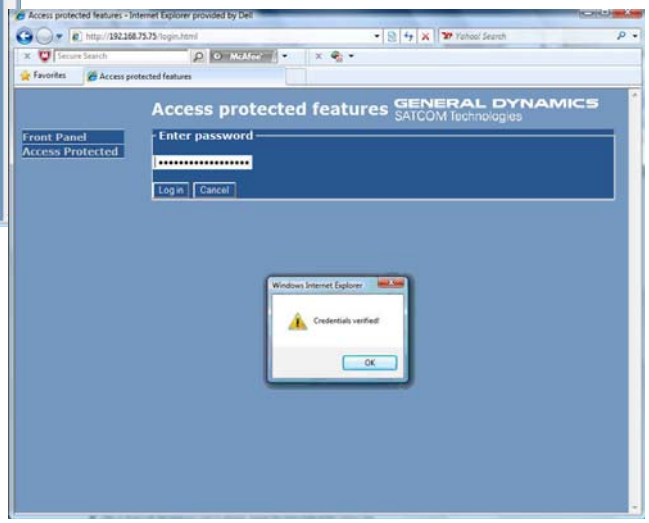


Figure 4.4

If the password is validated, you will be returned to the screen from which you came to the Access Protected Features screen, but with the new User Access Level selections available in menu buttons on the left-hand side of the screen.

Click the Cancel button to exit this screen without changing the current User Access Level.

Section IV Operating Instructions

4.3 Faults and Warnings

The Model 7000 Controller's Status LED will remain OFF unless a warning or fault occurs. This LED will initiate a blink code to indicate the "warning" number in yellow or a "fault" number in red.

Note:

- A **fault** is a failure mode which the user cannot reset under normal operation (i.e. hardware fault, connection broken).
- A **warning** indicates that operations are not working correctly or operational limits have been reached (i.e. travel limits, can't find satellite, can't lock on GPS signal, stop all motion, etc). In most cases the user can correct the condition and try again.

If the fault or warning can be corrected, the user depresses the **HALT/RESUME** button to resume the current acquisition sequence.

4.4 Blink Codes

The bi-color (Red/Yellow) Status LED is used to display a blink code when a warning (Yellow) or fault (Red) condition exists. The Blink code is a combination of short flashes making a cycle. A short flash is 0.5 second ON and 0.5 second OFF when indicating a number. If more than one code is stored, the light will be OFF for 2.5 seconds before the next code is displayed. The cycle continues until the warning/fault is cleared. All blink codes correspond to warning or fault conditions identified on the GUI screens.

BLINK CODE	WARNING (YELLOW)	FAULT (RED)
SOLID	Warming up/Not Ready	
1	Invalid Satellite Configuration	No Board Serial Number entered
2	No GPS Signal	No communication with ACE
3	Position Has Changed	No communication with Modem
4	Azimuth Stall - Obstruction or over-current or no encoder pulses..	No LNB signal status (min noise)
5	Polarity Stall - Obstruction or over-current or no encoder pulses..	Automatic Cross-Pol Fail
6	Max Elevation Exceeded	Tx not available
7	Did not acquire (time out)	Stow Az fault
8	No Reference Satellite on Target Polarity Found	Tilt unstable 5 minutes
9	ACE Startup error	Tx DC on Fail
10	Tilt Change over threshold limit	Hardware Error
11	Elevation Stall - Obstruction or over-current or no encoder pulses..	

Figure 4.5

Note: For multiple warnings or faults, faults have priority over warnings and the list has top-down priority.

Section IV Operating Instructions

4.5 Network Setup

Although the Mobile VSAT can be completely assembled without connecting it to a computer, to access the Internet, the Mobile VSAT must be connected to your computer. You can connect in one of two methods.

1. Connecting using a Router
2. Connecting directly to your computer

The following diagram shows the basic network connections and default IP addresses for the Mobile VSAT

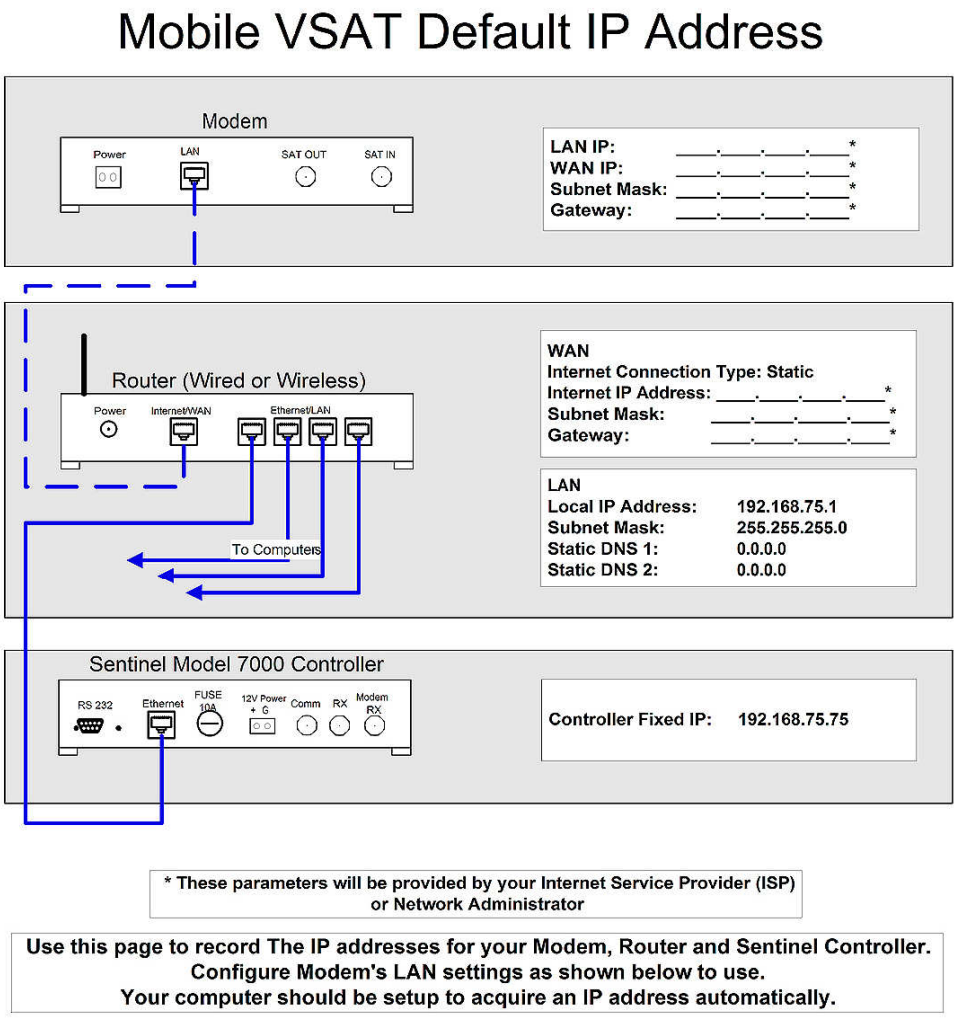


Figure 4.6

Navigation to the Front panel menu

The front panel screen or main menu is accessed before any others when you first start the web browser. To access this screen, you must be on the network that the ICE board is connected to. Most often, this will be through a router with an ICE and PC attached to it. However, the ICE can also be connected directly to the PC with an RJ-45 cable. In either case, the default way to access the main menu is through the Internet Protocol (IP) address 192.168.75.75. This requires the router (if used) and PC to have the 192.168.75.x base addresses, where 'x' is any number from 1 to 254, except 75.

- **Note: The 'x' for the router and PC must be different. You can change the base 192.168.75.x address to any available IP address, but you will have to first access the ICE through the default address and then change the network address that the ICE responds to. Next, you can change the PC and router base IP addresses as appropriate, and then repower the ICE board.**

- **Note: The default address of 192.168.75.75 is always available, even after changing the ICE IP address in network configuration. However, it can't be used to access the ICE GUI unless the PC and router (if used) are on the same 192.168.75.x local network.**

Section V Service and Maintenance

5.1 Registration / Warranty / Service

This section intentionally left blank.

5.2 System Maintenance

- Any debris, snow, ice, leaves etc. should be removed before trying to stow or deploy antenna system.
- Do not try to remove any build up while the antenna is transmitting.
- Dust and dirt is expected to gather on the antenna, but may be rinsed away with water from a hose or pail.
- Do not force water into gears, motors or bearing surfaces with high pressure from a hose.

Section VI Reference

6.1 ISP Information

After your Mobile VSAT Auto Acquire Mobile Satellite Internet System has been installed, programmed, and brought online, the following information will be available from your ISP. It is recommended that you record and keep the information available. This information is exclusive to your specific unit and therefore should be kept confidential.

PLEASE RECORD AND KEEP THE FOLLOWING INFORMATION

Your Site Account Number (SAN Number):	
Your PIN Number:	
Registered to:	Name: Address: City: State, Zip: Country: Telephone: E-Mail:
Modem Type and Model:	
Service Package:	
Satellite Name:	
Service and Support Group:	Name: Contact: Address: City: State, Zip: Telephone: E-Mail: Website:
Installer:	
Installer Certification #:	
Date Installed:	
Date Registered:	
Registration Number:	
Hardware (ICU) Serial Number:	
Mobile VSAT Serial Number:	

Figure 6.1

Section VI Reference

6.2 Basic Wiring Diagram

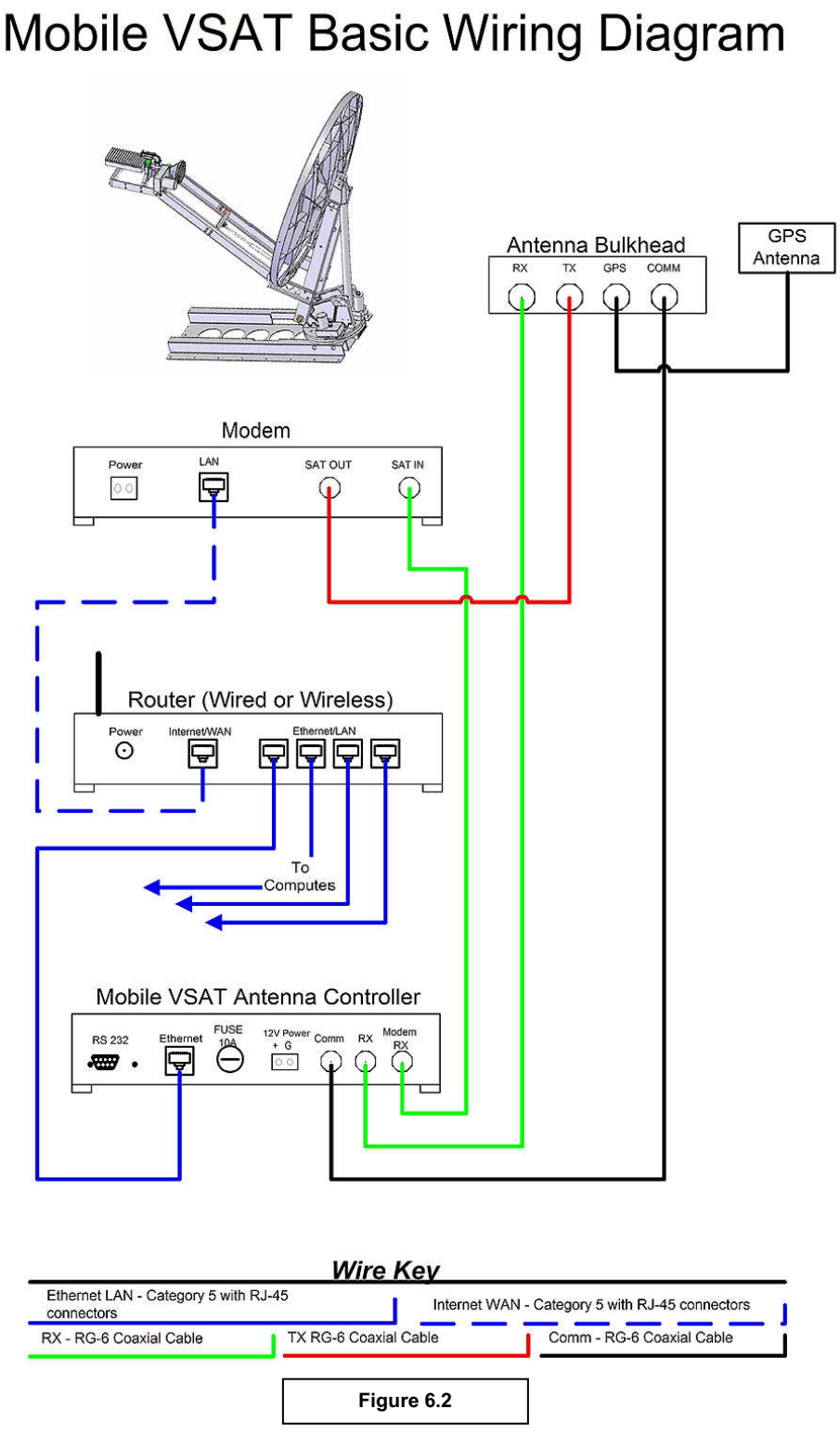
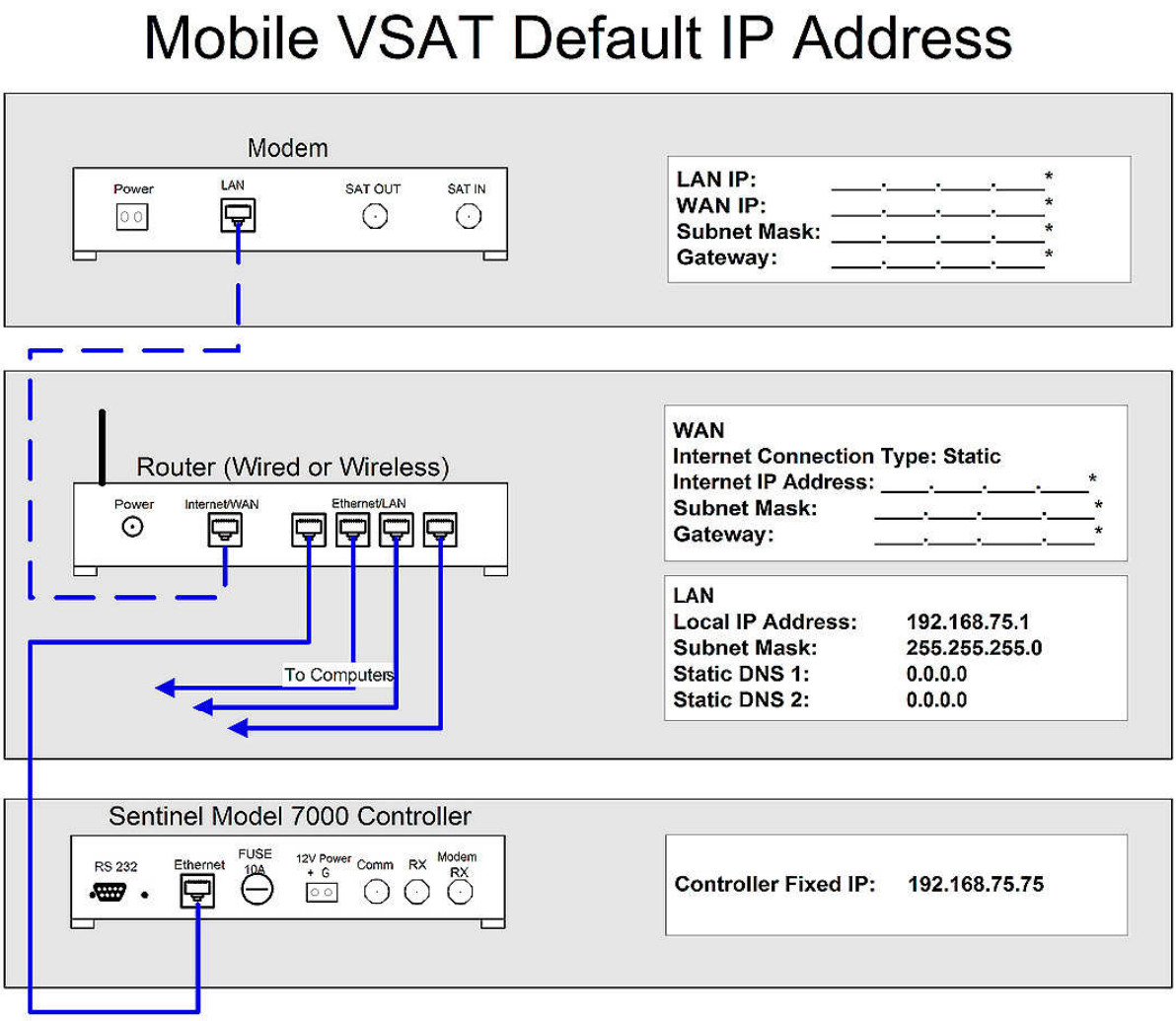


Figure 6.2

Section VI Reference

6.3 IP Addressing



*** These parameters will be provided by your Internet Service Provider (ISP) or Network Administrator**

**Use this page to record The IP addresses for your Modem, Router and Sentinel Controller.
Configure Modem's LAN settings as shown below to use.
Your computer should be setup to acquire an IP address automatically.**

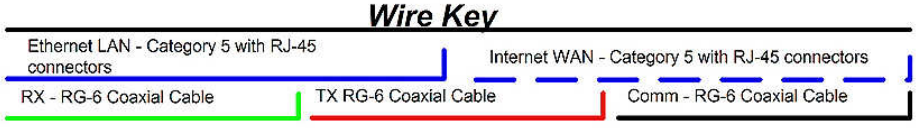
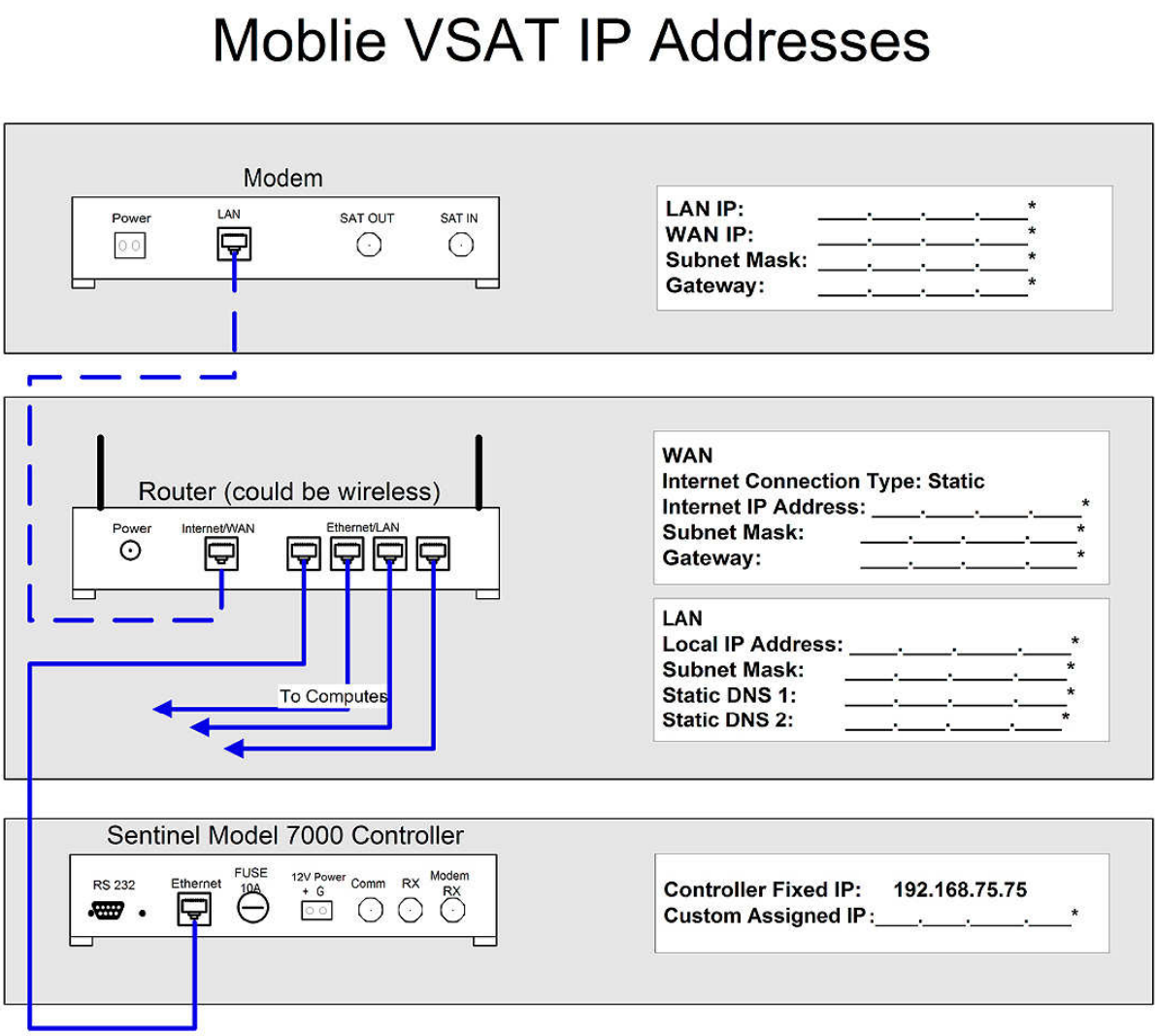

Wire Key
Ethernet LAN - Category 5 with RJ-45 connectors
Internet WAN - Category 5 with RJ-45 connectors
RX - RG-6 Coaxial Cable
TX RG-6 Coaxial Cable
Comm - RG-6 Coaxial Cable

Figure 6.3

Section VI Reference

6.3 IP Addressing



Use this page to record The IP addresses for your Modem, Router and Sentinel Controller if you changed from the default Controller IP address.

*** These parameters will be provided by your Internet Service Provider (ISP) or Network Administrator**

Wire Key

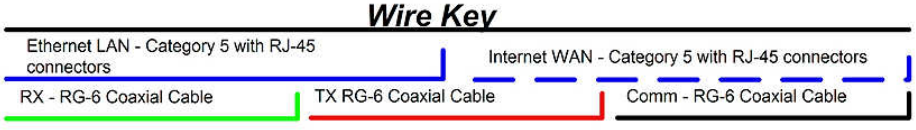

Ethernet LAN - Category 5 with RJ-45 connectors
Internet WAN - Category 5 with RJ-45 connectors
RX - RG-6 Coaxial Cable
TX RG-6 Coaxial Cable
Comm - RG-6 Coaxial Cable

Figure 6.4

Section VII Specifications

7.1 Technical Specifications

Technical Information Regarding 1.2 Meter Mobile VSAT Antenna	
Reflector Type:	1.2m Single Offset Prime Focus Compression Molded FRP – Single Piece
Weight:	138 pounds (63 kg)
Stowed Dimensions:	84” long x 48.5” wide x 16.5” high (213cm L x 123cm W x 42cm H)
Deployed Height:	75” max. (191cm)
Polarization:	Feed Rotation Cross-pol Isolation 35dB min.
Environmental	
Operational Wind Speed:	35 mph w/0.25dB max. loss @ Ku-band (56 km/h)
Operational Wind Speed to Stow:	50mph (80 km/h)
Stowed Wind Speed:	125 mph (200 km/h)
Operational Temperature:	-40℉ to 140℉ (-40℃ to 6 0℃)
Survival Temperature:	-50℉ to 160℉ (-46℃ to 71℃)
Mount Specifications	
Elevation Adjustment Range:	0° to 70° Look Angle
Azimuth Adjustment Range:	430° (±215°)
Skew (Polarization) Adjustment Range:	±65°
Global Positioning System (GPS):	Included
Tilt Sensors:	Included
Voltage / Power	
Motor Voltage:	24V DC
Cabling:	
Transmit (Tx):	RG6
Receive (Rx):	RG6
Electrical Interface:	RG6
Controller:	
User Interface:	Two-button; Acquire/Stow, Halt/Resume
Cable Interfaces:	(1) RS-232 Serial 9 Pin (2) Ethernet RJ-45 (10/100)
Dimensions:	7.0” Wide x 1.75” High x 7.25” Deep (17.8cm W x 4.4cm H x 18.4cm D)
Voltage / Power:	12V DC (120VAC Optional)

Figure 7.1

S*ection VII Specifications*

7.1 Technical Specifications

Technical Information Regarding 98cm Mobile VSAT Antenna	
Reflector Type:	98cm Single Offset Prime Focus Compression Molded FRP – Single Piece
Weight:	123 pounds (56 kg)
Stowed Dimensions:	67.5” long x 39” wide x 15” high (171cm L x 99cm W x 38cm H)
Deployed Height:	62” max. (157cm)
Polarization:	Feed Rotation Cross-pol Isolation 35dB min.
Environmental	
Operational Wind Speed:	40 mph w/0.25dB max. loss @ Ku-band (64 km/h)
Operational Wind Speed to Stow:	50mph (80 km/h)
Stowed Wind Speed:	125 mph (200 km/h)
Operational Temperature:	-40℉ to 140℉ (-40℃ to 6 0℃)
Survival Temperature:	-50℉ to 160℉ (-46℃ to 71℃)
Mount Specifications	
Elevation Adjustment Range:	0° to 70° Look Angle
Azimuth Adjustment Range:	430° (±215°)
Skew (Polarization) Adjustment Range:	±65°
Global Positioning System (GPS):	Included
Tilt Sensors:	Included
Voltage / Power	
Motor Voltage:	24V DC
Cabling:	
Transmit (Tx):	RG6
Receive (Rx):	RG6
Electrical Data Interface:	RG6
Controller:	
User Interface:	Two-button; Acquire/Stow, Halt/Resume
Cable Interfaces:	(1) RS-232 Serial 9 Pin (2) Ethernet RJ-45 (10/100)
Dimensions:	7.0” Wide x 1.75” High x 7.25” Deep (17.8cm W x 4.4cm H x 18.4cm D)
Voltage / Power:	12V DC (120V AC Optional)

Figure 7.2

Section VII Specifications

7.2 Hardware

A description of the reflector mounting hardware for each size antenna is shown in the following tables.

98cm Reflector Mounting Hardware Kit			
Item	**Part Number**	**Description**	**Qty.**
1	8038-020	Carriage Bolt, 5/16-18 x 2.50	2
2	8038-028	Carriage Bolt, 5/16-18 x 3.50	2
3	8201-034	Flat Washer, 5/16”	4
4	8202-028	Lock Washer, 5/16”	4
5	8500-293	Hex Nut, 5/16-18	4

1.2m Reflector Mounting Hardware Kit			
Item	**Part Number**	**Description**	**Qty.**
1	8038-024	Carriage Bolt, 5/16-18 x 3.00	2
2	8038-029	Carriage Bolt, 5/16-18 x 3.75	2
3	8201-034	Flat Washer, 5/16”	4
4	8202-028	Lock Washer, 5/16”	4
5	8500-293	Hex Nut, 5/16-18	4

Figure 7.3

Revisions

REV.	DESCRIPTION	DATE	APPROVED
H	Mobile VSAT re-write	11/30/10	DU
G	General re-write. Create Owner's Manual	02/14/10	DU
F	Revised Section 3.1 and general edit.	09/21/09	
E	Edits added from April 7 input and follow-on discussions	04/30/09	R.F.
D	Edits and added wiring instructions and diagram	02/27/09	R.F.
C	Edits	02/24/09	R.F.
B	Added GUI screens description.	06/23/08	R.F.
A	Change front and rear panels, switch def, add blink codes.	10/24/07	R.E.S.
-	Released for review.	04/05/07	R.F.

If you have any questions about the General Dynamics' Mobile VSAT System, please contact our customer service department at 828-464-4141 (8:00am – 5:00pm EST Monday through Friday) or visit our website at www.gdsatcom.com.